

CLAIMS

1. An isolated small RNA virus wherein the virus is up to 40nm in size, is not occluded and infects insect species including *Heliothis* species.

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2. The virus of claim 1 comprising a genome hybridizable with the nucleotide sequence of RNA 1 (SEQ ID No: 39) or RNA 2 (SEQ ID No: 47).

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3. The virus of claim 1 which comprises proteins which are capable of generating antibodies said antibodies being immunologically reactive with the large coat protein of HaSV.

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4. The virus of claim 1 wherein said virus has a particle size of approximately 35 to 38 nm and comprises a genome with RNA of about 5.3 and 2.4 kb in length.

5. The virus of claim 4 wherein said particle comprises coat proteins of approximately 7 and 64 KDa.

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6. The virus of claim 1 wherein said virus is HaSV or a mutant, variant or derivative thereof.

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7. The virus of claim 6 wherein said virus comprises a nucleic acid sequence which is an encapsidation sequence, structure or signal with at least 50% nucleotide sequence identity to the corresponding nucleotide sequences of HaSV.

8. The virus of claim 6 wherein said virus comprises a nucleic acid sequence which encodes proteins with at least 60% amino acid sequence identity to the corresponding proteins or polypeptides of HaSV.

9. The virus of claim 6 wherein said virus comprises a nucleic acid sequence which has at least 50% nucleotide sequence identity to the portions of the HaSV genome which encode: amino acid residues 401 to 600 of the replicase enzyme or amino acid residues 273 to 435 or 50 to 272 or 436 to the COOH terminus of the capsid protein.

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10. An isolated nucleic acid molecule comprising a nucleic acid sequence hybridizable with RNA 1 (SEQ ID No: 39) or RNA 2 (SEQ ID No: 47) under low stringency conditions.

10 11. The molecule of claim 10 wherein said sequence is hybridizable under medium stringency conditions.

12. The molecule of claim 11 wherein said sequence is hybridizable under high stringency conditions.

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13. The molecule of claim 10 wherein said sequence encodes P7, P16, P17 (SEQ ID No: 48), P64, P70 (SEQ ID No: 52), P71 (SEQ ID No: 50), P11a (SEQ ID No: 42), P11b (SEQ ID No: 44), P14 (SEQ ID No: 46) or P187 (SEQ ID No: 40) or a mutant, variant or derivative thereof.

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14. The molecule of claim 13 wherein said sequence encodes P7, P64, or P71 (SEQ ID No: 50) or a mutant, variant or derivative thereof as herein described.

15. The molecule of claim 10 in which the molecule is a probe or primer for the
25 nucleic acid sequence of RNA 1 (SEQ ID No: 39) or RNA 2 (SEQ ID No: 47), or mutants, variants or derivatives thereof, said molecule comprising nucleic acid sequences suitable for detection of, or replication of, RNA 1 (SEQ ID No: 39) or RNA 2 (SEQ ID No: 47), or portions thereof under appropriate conditions.

16. The molecule of claim 15 in which the molecule is one of a primer pair, wherein said primer is derived from a sequence of RNA 1 (SEQ ID No: 39) or RNA 2 (SEQ ID No: 47) which is located between 300 and 1500 bp from another sequence of RNA 1 (SEQ ID No: 39) or RNA 2 (SEQ ID No: 47) being the sequence of the other primer of said primer pair.

17. The molecule of claim 16 comprising the following sequences

5' GGGGGGAATTCATTTAGGTGACACTATAGTTCTGCCTCCCCGGAC (called "HvRISP5p" herein) (SEQ ID No: 11)

5' GGGGGGATCCTGGTATCCCAGGGGGGC (called "HvR13p" herein) (SEQ ID No: 12)

5' CCGGAAGCTTGTTTTCTTTCTTTACCA (called "Hr2cdna5" herein) (SEQ ID No: 13)

5' GGGGGATCCGATGGTATCCCGAGGGACGC TCAGCAGGTGGCATAGG (called "HvR23p" herein) (SEQ ID No: 14)

AAATAATTTTGTTACTTTAGAAGGAGATATACATATGAGCGAGCGAGCACA C (called "HVPET65N" herein) (SEQ ID No: 15)

AAATAATTTTGTTTAACCTTAAGAAGGAGATCTACATATGCTGGAGTGGCG TCAC (called "HVPET63N" herein) (SEQ ID No: 16)

GGAGATCTACATATGGGAGATGCTGGAGTG (called "HVPET64N" herein) (SEQ ID No: 17)

GTAGCGAACGTCGAGAA (called "HVRNA2F3" herein) (SEQ ID No: 18)

GGGGGATCCTCAGTTGTCAGTGGCGGGGTAG (called "HVP65C" herein) (SEQ ID No: 19)

5 GGGGATCCCTAATTGGCACGAGCGGCGC (called "HVP6C2" herein) (SEQ ID No: 20)

AATTACATATGGCGGCCCGCCGTTTCTGCC (called "HVP6MA" herein) (SEQ ID No: 21)

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AATTACATATGTTCGCGGCCCGCCGTTTCT (called "HVP6MF" herein). (SEQ ID No: 22)

18. The molecule of claim 10 additionally comprising a ribozyme sequence.

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19. A vector comprising the molecule of claim 10.

20. A vector comprising the molecule of claim 13.

20 21. A vector comprising the molecule of claim 14.

22. A vector comprising the molecule of claim 15.

23. A vector comprising the molecule of claim 16.

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24. A vector comprising the molecule of claim 17.

25. A vector comprising the molecule of claim 10 capable of replication, expression and/or encapsidation in an animal, plant or bacterial cell.

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26. A vector comprising the molecule of claim 10 capable of transferring said nucleic acid molecule to a plant cell.

27. The vector of claim 25 or claim 26 which comprises a ribozyme for facilitating replication, expression or encapsidation of the transcript.

28. The vector of claim 25 or claim 26 wherein having a ribozyme sequence selected from one of the following sequences

5' CCATCGATGCCGGACTGGTATCCCAGGGGG (SEQ ID No: 5)

5' CCATCGATGCCGGACTGGTATCCCGAGGGAC (SEQ ID No: 6)

5' CCATCGATGATCCAGCCTCCTCGCGGCGCCGGATGGGCA (SEQ ID No: 7)

5' GCTCTAGATCCATTCGCCATCCGAAGATGCCCATCCGGC (SEQ ID No: 8)

5' CCATCGATTTATGCCGAGAAGGTAACCAGAGAAACACAC (SEQ ID No: 9)

5' GCTCTAGACCAGGTAATATACCACAACGTGTGTTTCTCT (SEQ ID No: 10)

29. The vector of claim 25 or claim 26 which comprises a promoter for facilitating expression said promoter selected from the group of the Drosophila promoters, heat shock promoters, baculovirus promoters, CMV promoters.

30. A vector according to claim 20 in which the vector is selected from the group consisting of pDHVR1, pDHVR1RZ, pDHVR2, pDHVR2RZ, p17V71, p17E71, pPH, pV71, p17V64, p17E64, pP64, pV64, pBacHVR1, pBacHVR1RZ, pBacHVR2, pBacHVR2RZ, pHSPR1, pHSPR1RZ, pHSPR2, pHSPR2RZ, pSR1(E3)A, pSR1(E3)B, pSR2A, pSR2B, pSX2P70, pSXR2P70, pSRP2B, pBHVR1B, pBHVR2B, pT7T2P64, pSR2P70, pT7T2P65, pT7T2P70, pT7T2-P71, pBSKSE3,

pBSR15, pBSR25p, pSR25, phr236P70, phr235P65, pGemP63N, pGemP64N, pGemP65N, pP64N, pP65H, pTP6MA, pTP6MF, pTP17, pTP17delBB, pP656 and p70G.

5 31. A host cell comprising the vector of claim 19.

32. The host cell of claim 31 wherein said cell is an insect cell or a plant cell.

33. A recombinant insect virus vector comprising the nucleic acid molecule of claim
10 10.

34. The virus vector of claim 33 comprising material derived from baculovirus including NPV and GV, entomopoxvirus, cytoplasmic polyhedrosis virus.

15 35. The virus vector of claim 33 wherein said vector is capable of infecting insect species including *Heliothis* species.

36. The virus vector of claim 33 comprising one or more nucleic acid sequences which encode substances which are deleterious to insects.

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37. A method of controlling insect attack in a plant comprising genetically manipulating said plant so that it is capable of producing HaSV or mutants, derivatives or variants thereof, or an insecticidally effective portion of HaSV, mutants, derivatives or variants thereof such that insects feeding on the plant are deleteriously effected.

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38. A transgenic plant resistant to insect attack comprising a genome or subgenome capable of expressing the molecule of claim 10 such that the transgenic plant produces HaSV or mutants, derivatives or variants thereof, or an insecticidally effective portion of HaSV, mutants, derivatives or variants thereof such that insects feeding on the
30 transgenic plant are deleteriously effected.

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